State of Illinois
Department of Registration and Education
STATE GEOLOGICAL SURVEY DIVISION
John C. Frye, Chief

GUIDE LEAFLET

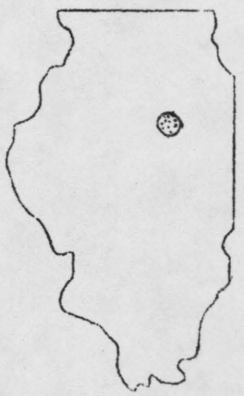
GEOLOGICAL SCIENCE FIELD TRIP

Sponsored by
ILLINOIS STATE GEOLOGICAL SURVEY

FAIRBURY AREA

Livingston County

Pontiac, Cullom, Sibley and Colfax Quandrangles



Leaders
George M. Wilson and George E. Ekblaw

Urbana, Illinois
October 8, 1955

GUIDE LEAFLET 1955 E

HOST: Fairbury Township High School

FAIRBURY GEOLOGICAL SCIENCE FIELD TRIP

Itinerary

Assemble in parking area of Fairbury Township High School.

0.0	0.0	Turn left (south) on North Seventh Street.
0.3	0.3	STOP. Four-way stop. Straight ahead.
0.1	0.4	CAUTION. Railroad crossing.
0.2	0.6	STOP. U. S. Highway 24. Continue straight ahead.
0.2	0.8	Indian Creek sluiceway. Note relatively wide, generally flat bottom of valley.
0.2	1.0	Indian Creek. Note relics of old gravel pits on both sides of road.
0.2	1.2	Leaving Indian Creek sluiceway and rising on back slope of Inner Cropsey Moraine. This is a low, broad moraine with gentle relief and locally two or three crests.
2.3	3.5	Turn right (west).
1.0	4.5	Principal crest of Inner Cropsey Moraine.
0.6	5.1	Stop 1. View from outer slope of principal crest of Inner Cropsey Moraine (a) south across intracrest plain and valley and across outer subcrest of moraine and (b) west across valley of Indian Creek where it flows through the moraine.

Geologically the Fairbury area offers, among other features, unusual opportunity to study (a) the relation of glacial lakes and glacial moraines and (b) atypical valleys, sometimes termed sluiceways, created by outlets from the glacial lakes. Sand and gravel deposits prevail in these sluiceways and in other subglacial channels and in the outwash plains and valley trains into which they merge. Several glacial lakes covered considerable areas of Livingston County. A review of the conditions that created this situation seems pertinent.

Tens and hundreds of thousands of years ago most of Illinois, together with most of northern North America, was covered by huge ice sheets or glaciers. These glaciers expanded from centers in what is now eastern Canada. They developed when for some reason not yet determined the mean annual temperatures in the region were somewhat lower than now, so that not all of the snow that fell during the winters was melted during the summers. The snow residues accumulated year after year until they became a sheet of ice so thick that as a result of its weight the lowermost part began to flow outward, carrying with it the soil and rocks on which it rested and over which it moved. The process continued until the glacier extended into our country as far south as Missouri and Ohio rivers.

Moderation of temperatures halted the glacier. For a while the melting of the ice balanced its accumulation and expansion, so that its margin remained stationary. Later the melting exceeded the accumulation and expansion, and the ice front gradually melted back until the glacier desappeared entirely.

As the glacier melted, all of the soil and rocks which it had picked up as it advanced were released. Some of this material or drift was deposited in place as the ice melted. Such material consists of a thorough mixture of all kinds and sizes of rocks and is known as till. Some of the glacial drift was washed out with the meltwaters. The coarsest outwash material was deposited nearest the ice front and gradually finer material farther away. The finest clay may have been carried all the way to the ocean. Where the outwash material was spread widely in front of the glacier it forms an outwash plain; where it was restricted to the river valleys it forms what are called valley trains.

At times, especially in the winters, the outwash plains and valley trains were exposed as the meltwaters subsided, the wind picked up silt and fine sand from their surfaces, and blew them across the country to form deposits of what is known as loess. Glacial loess mantles most of Illinois. Near the large river valleys it may be as much as 60 to 80 feet thick. Far from the valleys it may be measured only in inches, if it can be identified at all.

It is now commonly known that there were four major intervals of glaciation during the Pleistocene Epoch or Great Ice Age (see accompanying table), and that between each pair there was a long interglacial interval in which conditions were as they are today. It is also commonly known that during each major glaciation there were a number of retreats and readvances. This was particularly true during the last or Wisconsinan (glacial) Stage.

The glacial drift visible in the Fairbury area is all of Wisconsinan age, the last glacial stage, but the earlier Illinoian and Kansan glaciers passed over the area, and the Nebraskan or oldest glacier may also have done so.

The position of the ice front at each advance of the glacier is usually marked by a ridge of till or moraine. The moraine represents the accumulation of drift at the ice margin while the advance and melting were essentially in balance, when more and more material was being brought to the edge of the advancing ice. When melting exceeded advance, so that the ice front retreated, the resulting drift deposits form a drift plain or till plain, whose surface may be almost level or more or less billowy.

As shown on the accompanying map, there are several moraines of Wisconsinan age in Illinois. The Shelbyville Moraine marks the maximum advance of the Wisconsinan glacier. Each of the other moraines marks the position to which the ice front readvanced after a recession of unknown distance from the position it had previously attained.

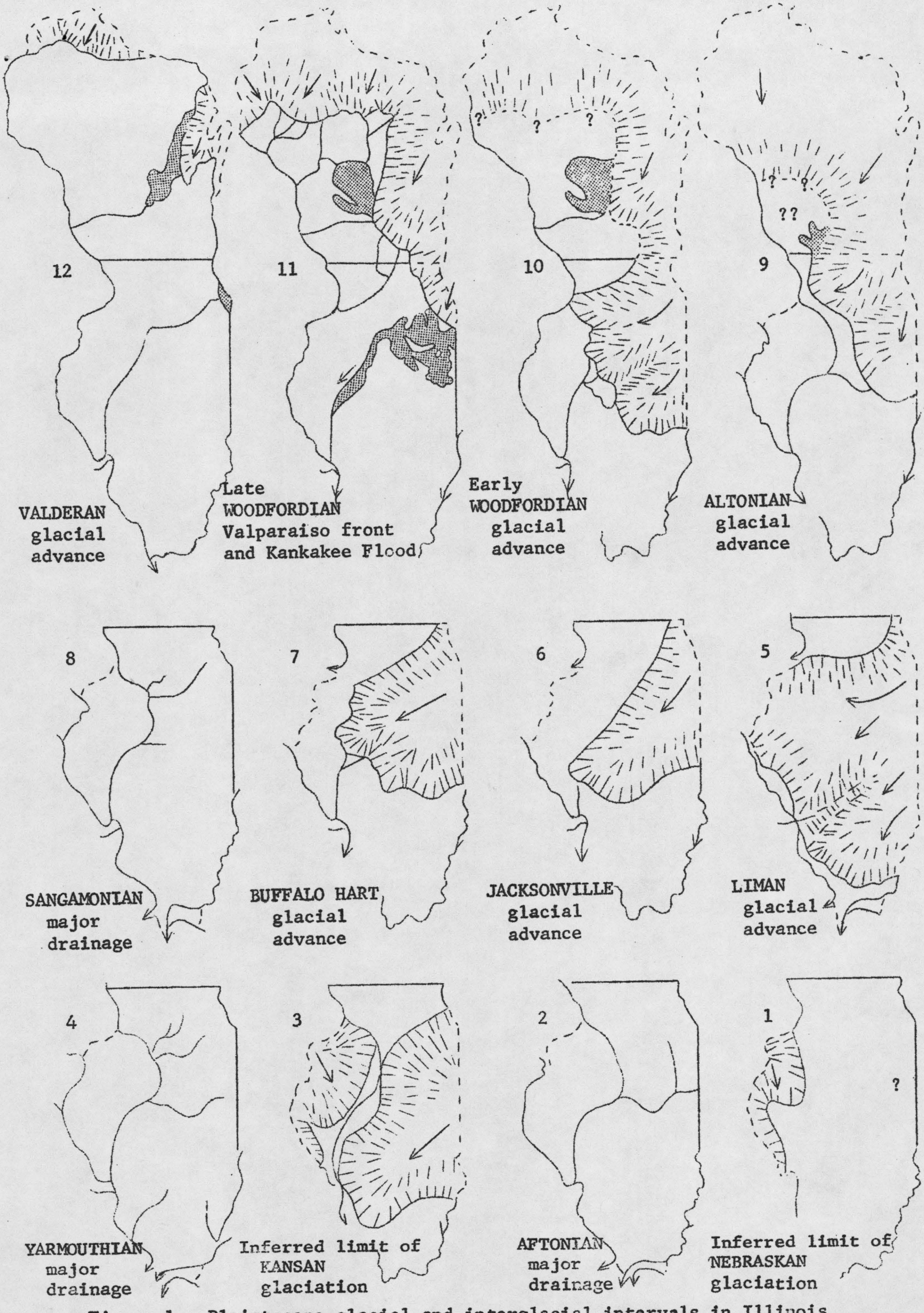


Figure 1. Pleistocene glacial and interglacial intervals in Illinois

The surface relief of moraines is generally greater than that of the drift plains. It is generally referred to as swell-and-swale, but on some moraines it is termed knob-and-kettle topography. Generally the outer slope and edge of the moraines is interrupted by valleys and re-entrant angles marking the courses of glacial rivers. At some places there are gaps in the moraines where subglacial streams presumably carried away most of the drift. Subglacial valleys may be distinguished from valleys developed by erosion in postglacial time by the fact that morainic topography occurs all the way down the valley slopes.

This stop is on the outer slope of one of the subcrests of the Inner Cropsey Moraine. About a mile to the south is another subcrest. Between them is a broad shallow intracrest sag which is now the valley of a small stream. The subcrests are not continuous over very long distances, nor is the same number distinguishable at all places along the moraine.

The Inner Cropsey Moraine is one in a series of three moraines, of which the other two are the Outer and Middle Cropsey, which, like the subcrests of either one, are not equally distinguishable or equal in magnitude at all places. South of Fairbury the Outer and Middle Moraines are both narrower than the Inner, and the Middle Moraine, on which the town of Cropsey is located, is higher and more prominent than either the Outer or Inner Moraines.

As a glacier began to recede, meltwater doubtless accumulated in local ponds or lakelets between the ice front and the moraine last formed, except where there were channels through the moraine through which water could drain. Where such drainage channels are absent, it may be presumed that as the ice front continued to recede, the local ponds and lakelets gradually merged into one large lake, that persisted until the glaciers uncovered some passage or until some outlet river eroded a channel through which the lake could be drained.

Geological studies show that such a lake, or a series of lakes, existed behind each of the three Cropsey Moraines. It has not been determined whether the older ones still existed until or were drained before the later ones developed. However, we do know that for a time the waters of the lake that locally existed behind the Inner Cropsey Moraine flowed out southward through a gap in the moraine, a gap which is now part of the valley of Indian Creek. This valley-gap can be observed as we proceed from this to the next stop.

0.2 5.3 Turn left (south).

0.1 5.4 Bear right (southwest).

0.1 5.5 Bridge over tributary of Indian Creek. Note low terraces ahead on both sides of road.

0.1 5.6 Bear left (south).

0.7 6.3 Sharp turn right (west).

0.3 6.6 Sharp turn left (south).

0.9 7.5 Outer edge of Inner Cropsey Moraine.

0.2 7.7 Turn right (west). Valley of Indian Creek to south and ahead.

0.2 7.9 Bridge over Indian Creek.

Stop 2. Hardly more than casual note of the size of Indian Creek, its channel, and its present floodplain is needed to conclude that the valley in which it here flows is much larger than the present stream would normally develop and that consequently (1) the creek is therefore what is known as an underfit stream and (2) the major part of the valley must have been developed by a stream of water much larger than the present one. The terraces that occur along both sides of the valley and a few feet above the present valley bottom probably are relics of the wider valley bottom of the old stream.

It is believed that this old, larger stream was a temporary southward outlet of the temporary glacial lake, known as Lake Ancona, that lay between the Inner Cropsey Moraine and the receding ice front of the glacier that built the moraine. It doubtless followed a subglacial channel through the moraine, and this is further verified by the fact that morainic topography exists along the upper slopes of the valley walls.

There will be opportunity during a considerable part of the rest of the forenoon itinerary to observe along Indian Creek Valley the features which reveal its extraordinary history.

0.7 8.6 Turn right (north).

0.2 8.8 Note erosional features along stream valley to right (east).

0.3 9.1 Jog sharp right (east), then left (north).

0.6 9.7 Note terraces along Indian Creek on right (east).

1.0 10.7 Turn left (west).

0.4 11.1 Stop 3. Weathering profile on Cropsey till exposed in south side of ditch along south side of highway.

Like many other things, rocks and minerals suffer changes when they are exposed to the weather. Although these changes are relatively slow, they become evident in earth deposits that are not disturbed over long periods of time and develop what is known as a weathering or soil profile in the surficial part of such deposits.

Following the practice established about 30 years ago by the Russian Glinka, soil scientists usually consider that the soil or weathering profile consists of 3 zones, designated A, B, and C from top down. The A zone is the "soil" zone, which is normally black or

gray in color. The B zone is the "subsoil" zone, and the C zone is the unaltered parent material.

The zonal effect results from the fact that the four principal processes which affect soil weathering all progress with the downward movement of groundwater but at different rates. These processes, listed in order according to their rate of progress, beginning with the most rapid, are (1) oxidation, (2) leaching of carbonates, (3) decomposition of more resistant minerals, and (4) accumulation of humus.

Consequently, in the A zone, in which the humus material derived from decaying plants has accumulated, the rock minerals are oxidized, leached, and decomposed. In the upper part of the B zone they are oxidized and leached and in the lower part of the B zone they are only oxidized. The oxidation zone is shown by the reddish or yellowish color resulting from the oxidation of iron minerals. The leached zone is determined by the absence of carbonates, as revealed by tests with a solution of hydrochloric acid.

At this stop the weathering profile is as follows:

	Thickness In.
Silt, black, humic	15
Silt, clayey, and gravel, noncalcareous	21
Till, calcareous, buff	45
Till, calcareous, gray (exposed)	15

0.3 11.4 Good view of a subglacial channel across the Inner Cropsey Moraine to south (left).

0.7 12.1 Turn right (north).

1.0 13.1 Turn right (east).

0.6 13.7 Good views of Inner Cropsey Moraine on both sides of highway.

1.3 15.0 Note spoil heaps of abandoned gravel pit in field some distance to right (south).

0.3 15.3 Descending from Inner Cropsey Moraine to Indian Creek sluiceway.

0.4 15.7 Old gravel pit on left (north) side of highway.

0.1 15.8 Turn left (north).

0.4 16.2 Bear right (northeast).

0.1 16.3 Old limestone quarry along Indian Creek on left (northwest); limestone is exposed in bank at south end of quarry.

0.1 16.4 Old limestone quarry and gravel pit to left (northwest) across Indian Creek, now used for garbage disposal.

Turn right (east).

0.2 16.6 Bear left (northeast).

0.4 17.0 Bear right (east).

0.3 17.3 Turn left (north).

0.7 18.0 Stop 4. Howard Arnold gravel pit in outwash along Indian Creek. Note irregular bedding, irregular distribution of sized deposits, especially gray silt, large number of boulders scattered through the outwash, weathering profile, and other features.

Straight ahead into Fairbury on First Street.

0.5 18.5 STOP. U. S. Highway 24. Straight ahead.

0.2 18.7 CAUTION. Railroad crossing.

FOUR-WAY STOP. Continue straight ahead.

0.2 18.9 Turn left (west) on West Maple Street. (See alternate instructions third line below).

0.05 18.95 Turn right (north) on North Webster Street.

0.05 19.0 Stop 5. Lunch in city park.

In case weather conditions make an outside lunch undesirable, at mileage 18.9 continue straight ahead on First Street two blocks, to Hickory Street, turn right (east) on Hickory Street to Seventh Street, turn (left) north on Seventh Street to High School. Park in parking area, and utilize cafeteria room for lunch. After discussion following lunch, return on Hickory Street to First Street. Turn right (north) on First Street.

After lunch, assemble for discussion on the occurrence of coal beds in the Fairbury area, which were formerly the basis for an important local industry.

Continue straight ahead (north) on North Webster Street.

0.2 19.2 Turn right (east) on West Cherry Street.

0.1 19.3 Turn left (north) on North First Street.

0.9 20.2 Stop 6. Approximate shoreline of Lake Ancona at minimum level.

The existence of a lake between the Inner Cropsey Moraine and the receding front of the glacier that built it has already been mentioned.

The lake has been named Ancona, after a small town in northwestern Livingston County.

As in the case of all such lakes, the first stage of Lake Ancona was doubtless the appearance of a number of ponds and lakelets between the ice front and the moraine. These ponds and lakelets had no uniform level—they were controlled strictly by local circumstances. As the ice front receded, the ponds and lakelets merged into larger and larger units, until eventually there was but one large lake.

In the early and intermediate stages of its development, the various units of the lake had individual outlets. The present valley of Indian Creek through the Inner Cropsey Moraine was the outlet for the portion that first covered the Fairbury area. The highest elevation of this outlet has not been determined, but it must have been at least 680 feet and was probably nearer 700 feet above mean sea level.

Outlets of other units of the lake were westward through the moraine, by way of Sandy Creek and some of its tributaries in the vicinity of Wenona. Doubtless because it was lower than any of the other outlets, the outlet by way of Sandy Creek became the one and only outlet when the lake became completely unified, and for a time it determined the elevation of the lake at about 670 feet above mean sea level. However, the outflowing waters eroded the outlet to a width of nearly a mile and down almost to 650 feet above sea level, before the receding ice front apparently opened up along what is now the Vermilion River near Lowell, an outlet so low that Lake Ancona presumably completely disappeared.

Waves and currents in a lake as large as Lake Ancona tend to smooth its bottom by eroding off the tops of the elevations and depositing the resulting detritus in the depressions. Consequently in the portion of the Inner Cropsey drift plain that was covered by the early higher stages of Lake Ancona the relief is more subdued than in the portion that was not so covered, and the portion that was covered by the semipermanent lake is almost flat. On the basis of these differences it appears that at its earliest stage the lake must have stood at an elevation of almost 700 feet above mean sea level, and that during its semipermanent stage it must have stood at a maximum of approximately 670 feet above mean sea level, and its boundary at this stage is shown on the itinerary map.

The lake is of course underlain by Inner Cropsey till deposited as the glacier melted back. On top of this till are deposits of silt, sand, and gravel washed out from the glacier as it receded, and on top of these deposits may be found laminated lacustrine silts. No other lacustrine deposits, such as marl and laminated clays, have been noted; possibly none may have been deposited because the lake existed relatively so short a time.

Continue straight ahead.

1.1 21.3 Bridge over shallow drain. Note shallowness of this drain, in flat bottom of Lake Ancona which is evident in all directions.

2.0 23.3 Turn right (east).

0.3 23.6 Bridge over South Branch Vermilion River.

0.2 23.8 Ascending outer slope of Chatsworth Moraine.

1.6 25.4 Stop 7. Outer crest of Chatsworth Moraine. To north is outlet valley of Lake Watseka.

Just as Lake Ancona was developed behind the Inner Cropsey Moraine, so a large lake was developed between the Chatsworth Moraine and the receding front of the Chatsworth glacier.

In its earliest stages this lake, known as Lake Watseka, drained through four outlet channels, all essentially at the same elevation of between 700 and 710 feet above mean sea level, in the vicinity of Hoopeston, and thence down North Fork Wabash-Vermilion River. As the ice front receded, it uncovered near what is now Buckley a lower outlet for the lake at an elevation about 670 feet above sea level, through the Chatsworth Moraine to Illinois-Vermilion River to the west, and the outlets near Hoopeston were consequently abandoned. Still later it exposed a still lower westward outlet, at an elevation about 650 feet above sea level, near Onarga. Both the Buckley and Onarga outlets led to the main westward outlet which we are viewing and which is now the valley of North Branch Illinois-Vermilion River.

Presumably Lake Watseka was completely drained when the Chatsworth glacier uncovered Kankakee River Valley. However, it must have been revived to the 650-foot level when the Marseilles glacier readvanced and again blocked Kankakee Valley, and it was again revived when the Kankakee Torrent, derived from the Valparaiso glacier, flooded Kankakee and Illinois Valleys. Erosion of the Illinois-Vermilion outlet at all of these times made a valley almost two miles wide down to an elevation of approximately 650 feet above mean sea level. This same "sluiceway" valley appears to continue down the Illinois-Vermilion Valley. The broad, flat valley bottom of Indian Creek may be related to this stage, as the depth of the Vermilion River Valley would determine the depth to which Indian Creek could erode.

Immediately across the outlet valley is the Outer Marseilles Moraine and close behind it, with only an intramorainal sag one to two miles wide between, is the main Marseilles Moraine. Through these moraines there are numerous subglacial valleys, along which occur considerable deposits of outwash. Several of these outwash-bearing subglacial valleys are tributary to the outlet valley.

Continue straight ahead.

0.2 25.6 Inner crest of Chatsworth moraine may be seen a few miles ahead, to the east.

0.3 25.9 Turn around at T-road intersection.

0.2 26.1 Marseilles Moraine may be seen a few miles to the north (right) across the outlet valley.

2.4 28.5 Turn right (north).

0.3 28.8 Turn left (west). Abandoned gravel pit on right (north).

1.4 30.2 Turn left (south). Entrance to Estep gravel pit.

0.2 30.4 Stop 8. Estep gravel pit.

This gravel pit happens to be located just where the westward outlet river of Lake Watseka joins glacial Lake Pontiac. Lake Pontiac is the name applied to the expanse of water that spread over Illinois-Vermilion Valley, up to an elevation of approximately 650 feet above mean sea level, when the floods of Kankakee Torrent filled Illinois River Valley, backed up tributary valleys, and spread over hundreds of square miles of adjoining areas (see accompanying Glacial Map of Northeastern Illinois). The Kankakee Torrent floods backed up not only in Vermilion River Valley to form Lake Pontiac but also in Iroquois basin to revive Lake Watseka and its westward outlet, with the result that the waters from Lake Watseka flowed directly into Lake Pontiac at this point.

The gravel in this pit is probably outwash from the Chatsworth Moraine, which lies just to the northeast across Illinois-Vermilion River, although there is a possibility that it is outwash of Cropsey age deposited as the Inner Cropsey glacier receded. It lies on till that is doubtless Cropsey in age. It has a wide range in size, including boulders, and contains some pebble-armored till balls, which are thought to indicate deposition not far from the ice front. The gravel is overlain by silt, which may represent in part the last stages of outwash and in part lacustrine deposits in Lake Pontiac.

It is interesting to compare the weathering profile developed here on the silt and gravel with the one that is developed on till, as seen at Stop 3. Here the oxidized zone extends to water level, several feet below the surface, and in openings in the upper part of the gravel is clay that has been carried down by ground water.

Some excellent examples of the formation of deltas may be observed where the waste water from the washing plant is discharged back into the pit.

0.2 30.6 Return to highway. Turn right (east).

Stop 9. Exposure of glacial deposits and Pennsylvanian bedrock along newly dredged channel of Illinois-Vermilion River.

Not far east of the approach to the bank of the channel there is an excellent exposure of a succession, from the top down, of (a) silt, (b) sand and gravel, (c) laminated silt, and (d) fresh till presumably of Cropsey age. Elsewhere sand and gravel and silt may be seen under this till.

Farther east the LaSalle Limestone and the overlying green, purple, and red shale of the LaSalle Cyclothem are exposed in the banks and bottom of the river. The irregular exposure of the limestone may be

due either to lenticular distribution or to small local folds. Much of the limestone has been faceted, polished, and striated by the glaciers which have overridden it. Some fossils occur in it. The bedrock is overlain by glacial deposits—generally sand and gravel first, then till.

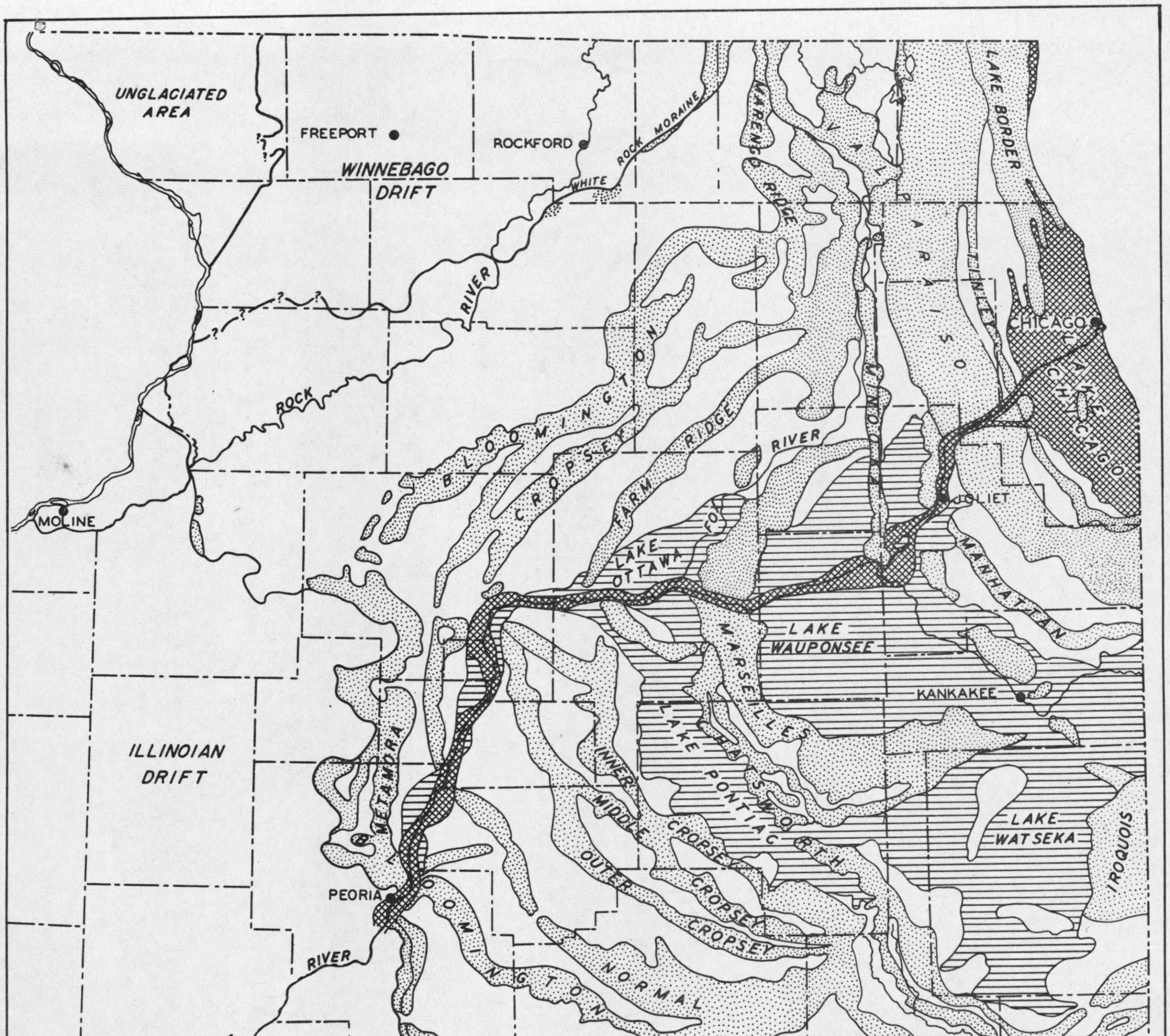
End of Field Trip

U. S. Highway 66 is about seven miles due west. U. S. Highway 24 can be reached at Fairbury. Illinois Highway 116 can be reached by returning east to the Fairbury road and then going north six miles.

Revised and Reprinted, March 1967.

TIME TABLE OF PLEISTOCENE GLACIATION
(Illinois State Geological Survey, 1969)

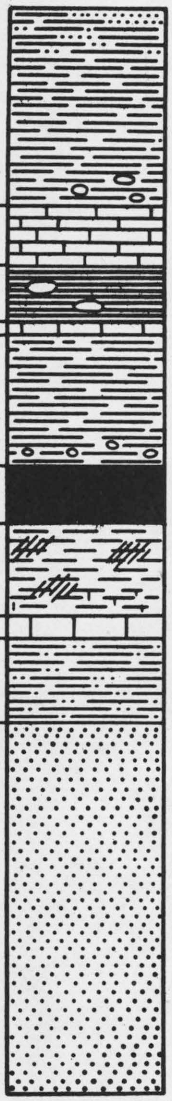
STAGE	SUBSTAGE	NATURE OF DEPOSITS	SPECIAL FEATURES
RECENT	Years Before Present	Soil, youthful profile of weathering, lake and river deposits, dunes, peat	
	5,000		
WISCONSINAN (4th glacial)	Valderan	Outwash	Outwash along Mississippi Valley
	11,000		
	Twocreekan	Peat and alluvium	Ice withdrawal, erosion
	12,500		
	Woodfordian	Drift, loess, dunes, lake deposits	Glaciation, building of many moraines as far south as Shelbyville, extensive valley trains, outwash plains, and lakes
	22,000		
	Farmdalian	Soil, silt, and peat	Ice withdrawal, weathering, and erosion
	28,000		
	Altonian	Drift, loess	Glaciation in northern Illinois, valley trains along major rivers, Winnebago drift
	50,000 to 70,000		
SANGAMONIAN (3rd interglacial)		Soil, mature profile of weathering	
ILLINOIAN (3rd glacial)	Buffalo Hart	Drift	Glaciers from northeast at maximum reached Mississippi River and nearly to southern tip of Illinois
	Jacksonville	Drift	
	Liman	Drift, loess	
YARMOUTHIAN (2nd interglacial)		Soil, mature profile of weathering	
KANSAN (2nd glacial)		Drift Loess	Glaciers from northeast and northwest covered much of state
AFTONIAN (1st interglacial)		Soil, mature profile of weathering	
NEBRASKAN (1st glacial)		Drift	Glaciers from northwest invaded western Illinois



GLACIAL MAP OF NORTHEASTERN ILLINOIS

George Ekblaw

Revised 1960



10 Shale, gray, sandy at top; contains marine fossils and ironstone concretions, especially in lower part.

9 Limestone; contains marine fossils.

8 Shale, black, hard, laminated; contains large spheroidal concretions and marine fossils.

7 Limestone; contains marine fossils.

6 Shale, gray; pyritic nodules and ironstone concretions common at base; plant fossils locally common at base; marine fossils rare.

5 Coal; locally contains clay or shale partings.

4 Underclay, mostly medium to light gray except dark gray at top; upper part noncalcareous, lower part calcareous.

3 Limestone, argillaceous; occurs in nodules or discontinuous beds; usually nonfossiliferous.

2 Shale, gray, sandy.

1 Sandstone, fine-grained, micaceous, and siltstone, argillaceous; variable from massive to thin-bedded; usually with an uneven lower surface.

AN IDEALLY COMPLETE CYCLOTHEM

(Reprinted from Fig. 42, Bulletin No. 66, Geology and Mineral Resources of the Marseilles, Ottawa, and Streator Quadrangles, by H. B. Willman and J. Norman Payne)

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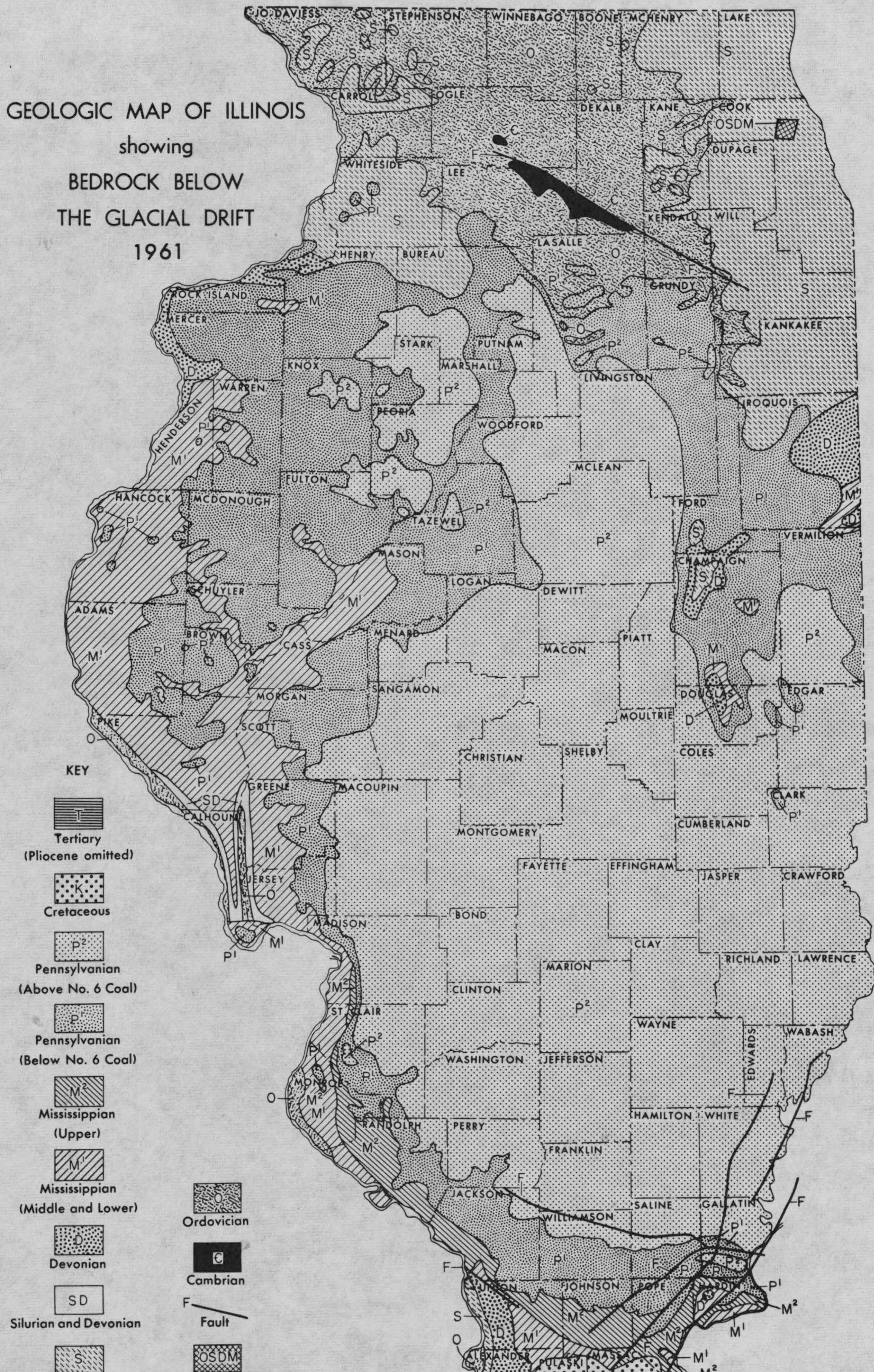
GEOLOGIC MAP OF ILLINOIS
showing
BEDROCK BELOW
THE GLACIAL DRIFT
1961



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Route Map

FAIRBURY Field Trip

October 8, 1955

Educational Extension

Illinois State Geological Survey